

REMARKS

The foregoing amendment amends claim 1, and adds claims 7-21. Pending in the application are claims 1-21, of which claims 1 and 17 are independent. The following comments address all stated grounds for rejection and place the presently pending claims, as identified above, in condition for allowance.

Claim 1 is amended to specify that the sealing member includes a circumferential portion and an extended portion extending seamlessly from the circumferential portion. Claim 1 further specifies that the extended portion of the sealing member extends along a significant portion of the gas channel in order to direct the flow of a fluid flowing therealong. Support for the amendment can be found throughout the application as originally filed, at least, for example, on page 8, fourth full paragraph and page 9, first and second full paragraphs and in Figures 1-4, 10-13, 16 and 18.

New claims 7-21 are added to more fully capture the claimed invention. New claims 7-16 depend from claim 1 and recite additional patentable features. Claim 7 further specifies that the gas channel of the fuel cell includes a plurality of surface features, and that the extended portion of said sealing member extends between adjacent surface features, as described on page 9, lines 14-15 and page 11, lines 4-7 and shown in Figure 6, for example.

Claims 8-10 specify that the extended portion forms a boundary portion for directing flow of the fluid along a significant portion of the reactant gas channel. Claim 9 further recite that the gas channel is U-shaped. Claim 10 recites a plurality of extended portions to form a plurality of U-shaped gas channels. Support for the subject matter of claims 8-10 can be found at least on page 9, lines 7-11 and is in Figures 1-4, 10-13, 16 and 18.

Claim 11 specifies that the gas channel comprises a plurality of passage units spaced apart from each other, wherein each of said plurality of passage units includes a plurality of surface features, as shown in Figures 1 and 2. Claim 12 specifies that the extended portion of said sealing member extends between a pair of said plurality of passage units, as shown in Figures 1 and 2, and described on page 7, fourth paragraph and page 8, line 23-page 9, line 1.

Claim 13 depends from claim 1 and further recites that the reactant gas channel comprises a plurality of grooves. Claim 14 depends from claim 13 and further specifies that extended portion of said sealing member extends between adjacent grooves. Support for claims 13 and 14 can be found in Figure 1 and on page 8, line 13-page 9, line 10.

Claim 15 depends from claim 1 and further recites that the reactant gas channel comprises a plurality of protrusions. Claim 16 depends from claim 15 and further specifies that the extended portion of the sealing member extends between adjacent protrusions. Support for claims 15 and 16 can be found at least in Figure 2 and on page 11, line 3-22.

New independent claim 17 recites the features of original claim 1 and further specifies that the extended portion of the seal member extends seamlessly between two surface features on the first separator. Claim 20 specifies that the surface features are grooves, while claim 21 specifies that the surface features are protruding members. Support for the subject matter of claim 17 can be found throughout the original application, at least, for example on page 8, lines 13-16 and page 11, lines 3-7.

Claim 18, which depends on claim 17, specifies that the extended portion separates a first linear portion of the reactant gas channel from a second linear portion of the reactant gas channel, as shown in Figures 1 and 2. Claim 19 depends on claim 18 and specifies that a connecting path for connecting the first linear portion and the second linear portion is formed between an end of the extended portion and the circumferential portion of the sealing member, as described at least on page 9, lines 7-11 and page 11, lines 18-22. *No new matter is added.*

Amendment and/or cancellation of the claims are not to be construed as an acquiescence to any of the objections/rejections set forth in the instant Office Action, and were done solely to expedite prosecution of the application. Applicants reserve the right to pursue the claims as originally filed, or similar claims, in this or one or more subsequent patent applications.

Interview with the Examiner

Applicants thank the Examiner for the interview of May 4, 2004. In the Interview,

Applicants' attorney discussed with the Examiner the differences between the sealing element of the fuel cell in the claimed invention and prior sealing elements. In particular, the sealing element of the claimed invention has an extended portion that extends from a circumferential portion at a first end along a significant portion of the passage area to the vicinity of an opposite end and helps direct the flow of a fluid therealong.

As discussed in the interview, the cited references do not appear to teach or suggest a fuel cell having a sealing member that extends significantly along or across the separator to create the "connecting portion" (i.e., the turning portion) for connecting two otherwise separate linear portions of a gas channel. The references, particular the Nishida reference, do not teach or suggest a sealing member having an extended portion that reaches "the vicinity of" the other side.

35 U.S.C. 102 Rejections

In the Office Action, the Examiner maintains and makes final the rejection of claims 1 and 6 under 35 U.S.C. 102 as being anticipated by the Davis reference (GB 2, 326,017). Applicants have amended claim 1 to clarify the differences between the invention and the cited references. Specifically, claim 1 now includes the distinction the sealing member includes a circumferential portion surrounding at least a portion of the circumference of the first separator, and an extended portion seamlessly connected to the circumferential portion and extending along a portion of a surface of the first separator. Claim 1 further specifies that the extended portion of the sealing member extends along a significant portion of the reactant gas channel in order to direct the flow of a fluid flowing therealong.

The reference of Davis does not teach or suggest the features of claim 1. Even if the Davis reference teaches that the bonding or adhesion of a separator forms a seamless gas channel with the electrode, as alleged by the Examiner, the Davis reference fails to teach or suggest that the sealing member includes the claimed circumferential portion and the claimed extended portion. The reference of Davis also does not mention a surface or plane opposing the membrane electrode assembly. Therefore, the Davis reference fails to teach or suggest a sealing member that is disposed *between* a membrane electrode assembly and a separator and including an extended portion that is seamlessly extended from the circumference of a separator, as recited in

claim 1. The Davis reference also fails to teach or suggest a seal member having an *extended portion seamlessly* connected to a circumferential portion and extending along a portion of a surface of the separator. The Davis reference also does not teach or suggest an extended portion extending along a significant portion of a gas channel in order to *direct* the flow of a fluid flowing therealong, as also recited in claim 1.

The Japanese Publication Number 2000-021418 of Nishida Kazufumi (the Nishida reference) does not compensate for the deficiencies of the Davis reference. The Nishida reference corresponds to Figure 19 of the present application, which is described in the “Background” section. In Nishida, a gasket portion on a separator includes connecting members that contact protruding members of the separator to form a gas channel. The separator and connecting members form a boundary portion or sidewall of the gas channel only along a peripheral edge of the separator, while the protruding members define a boundary portion or sidewall of the gas channel across the surface of the separator. In Nishida, the gasket does not include an extended portion that extends seamlessly from a circumferential portion across a *significant* portion of the reactant gas channel, as recited in claim 1. Rather, the connecting members (i.e., the phenol projecting parts) of Nishida merely extend a nominal, non-significant distance from one end of the gasket portion. The connecting members only extend as far as the end of the protrusions forming the gas passages, without extending sufficiently to be able to direct fluid flow. The connecting members of Nishida are incapable of actually directing the flow of a fluid flowing along the gas channel, as also recited in claim 1. Rather, the *protrusions* of the separator direct the flow of the fluid along the gas channel.

35 U.S.C. 103 Rejections

Regarding the rejection of claims 2-5 under 35 U.S.C. 103, because claim 1, from which claims 2-5 depend is patentable over the cited references, dependent claims 2-5, which include all of the limitations of claim 1, are also patentable.

New Claims

New claims 7-21 recite additional patentable features that are not taught or suggested in the cited references.

For example, the cited references do not teach or suggest a seal member having an extended portion that extends seamlessly *between* two surface features on the first separator, as recited in independent claim 17 and dependent claims 7, 13-16, and 20-21. The term “surface features” includes both grooves and protruding members. This recitation clarifies that the extended portion is not a top or bottom peripheral edge of the sealing member. Claims 17 distinguish over the cited references, in particular the Nishida reference. As shown, in Figure 2 and 3 and described in the “Background” section of the present application, the connecting members of the gasket in Nishida abut, but clearly do not extend *between* the protruding members. The connecting members extend only in an area that the protruding members are absent.

The use of a connecting portion extending between two surface features, such as between two grooves or between two protruding members, to form a part of a gas reactant channel provides significant advantages not taught or suggested in the prior art. The use of an extended portion of a seal member to define a boundary portion extending substantially across a separator prevents leaks and allows for a more compact fuel cell structure. For example, when a connecting portion of a sealing member connects to a protruding member at a jointed portion to form a gas channel, as disclosed in Nishida, a positioning *inter alia* height adjustment, becomes difficult at the joint portion as described in lines 13-25, page 3 of the specification. Because the jointed portion is not seamless, and a separate component, i.e., the protruding member, extends across the separator to form the boundary portion of the gas channel, a gap may be caused in the height direction. The gap may cause gas to leak to an adjacent passage (channel). In order to prevent this problem of gas leak, it becomes necessary to precisely carry out the height adjustment at the connection portion. However, since the thickness of a fuel separator is very thin, the surface of the separator is also very thin, which causes the surface of the separator to be easily curved. Therefore, the task of adjusting the height at the connection portion is made difficult.

The cited references also do not teach or suggest a fuel cell having an extended portion of a seal member that forms a boundary portion for directing flow of the fluid along a significant portion of the reactant gas channel, as recited in claims 8-10. Rather, the connecting members of

the gasket in Nishida extend only a small amount and do not direct fluid flow through a gas channel.

The cited references also do not teach or suggest an extended portion of a sealing member that extends between a pair of a plurality of passage units, as described in claims 11 and 12.

The cited references also fail to teach or suggest a gas channel formed by a first and second linear portions separated by an extended portion of a seal member, as recited in claims 18-19. The cited references further do not teach or suggest an extended portion of a sealing member that defines a connecting path for connecting a first linear portion and a second linear portion of a gas channel between an end of the extended portion and a circumferential portion of the sealing member, as set forth in claim 19.


CONCLUSION

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 12-0080, under Order No. SIW-016 from which the undersigned is authorized to draw.

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Respectfully submitted,

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